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Michigan Department of Community Health
Bureau of Laboratories

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New Recommendations for *Neisseria meningitidis*

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In March, the Bureau of Laboratories at the Michigan Department of Community Health (MDCH) wrote to the laboratory director of each clinical laboratory, as well as to each microbiology department director or supervisor in the state to assure that everyone was aware of the recently published recommendations for the handling of *Neisseria meningitidis* isolates in the laboratory. These new recommendations stem, in part, from the tragic experience at the MDCH laboratory last December in which one of our employees contracted a fatal laboratory-acquired infection with a meningococcus. No breach in then-accepted clinical laboratory practices for handling this agent were identified. As a result, CDC began an intensive effort to discover additional cases, to establish a rate of laboratory-acquired meningococcal disease and to identify practices which might put laboratorians at risk.

The findings of this investigation were published February 22, 2002, in MMWR [51(07);141-4]. While the exact mechanism of transmission could not be identified, the attack rate for microbiologists of 13 per 100,000 population is significantly greater than that for the general adult population in this country of 0.2 per 100,000 population. This risk was confined to microbiologists rather than laboratory scientists in general, so it is postulated that the handling of amplified concentrations of the organisms in culture accounts for the increased transmission.

CDC recommendations to prevent laboratory-acquired meningococcal disease include use of a biological safety cabinet (BSC) for manipulation of sterile-site isolates of *Neisseria meningitidis.* The use of personal protective devices such as splash guards, masks and goggles should be considered if a BSC is not available. Both of these approaches would protect workers from droplets and aerosols. If such protection is unavailable, manipulation of isolates should be minimized and the laboratory should consider sending isolates to reference laboratories with adequate protective equipment. Vaccines may afford some level of protection against serious illness from laboratory-acquired infections, but the current vaccine does not provide coverage against serogroup B, which was responsible for nearly 50 percent of the cases documented in this investigation. Laboratorians should recognize vaccination is only an adjunct to the primary focus of prevention, safe laboratory practices. Chemoprophylactic options should also be considered when there has been documented laboratory exposure.

The MDCH laboratory has made several modifications to the bureau biosafety program specific to *N. meningitidis*. MDCH instituted a policy of transferring any isolate believed to be or having the potential to be meningococcus, to the BSC. Latex or similar gloves are worn for all manipulations of these organisms. This is not limited to isolates from sterile sites only, recognizing the potential of any meningococcus to cause serious, invasive disease. Vaccine is made available to any employee with competencies for any procedure in which this organism may be handled.

All clinical laboratories to are asked to evaluate their procedures for handling this agent and to take steps to insure the safety of their employees. This previously under-recognized occupational hazard to microbiologists requires a thoughtful and purposeful response from managers and administrators.

Bovine Tuberculosis in Michigan

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Mycobacteriology/Mycology Unit

Recently, MDCH identified the first human case of bovine Tuberculosis (TB) due to the same strain of *Mycobacterium bovis* found in Michigan's animals. The case is under investigation to determine the source of infection.

Mycobacterium bovis, the causative agent of bovine TB is infrequently found in Michigan. Although TB was common in cattle in the first part of the 1900's, the prevalence was significantly reduced over the years due to rigorous testing and control of cattle by the Michigan Department of Agriculture (MDA). In 1979 Michigan was designated a "Bovine TB Free State" and maintained that status until 2000 when the United States Department of Agriculture (USDA) removed the TB free status following an outbreak of bovine TB in Michigan's white-tailed deer and domestic cattle.

Bovine TB has been found in other parts of the United States eight times but the disease had never been self-sustaining in free ranging deer until it was detected in Michigan. It was detected in one deer in 1974 and again in one deer in 1994. Investigation of the current outbreak began in 1994 after a Michigan hunter, suspicious of nodules seen while field dressing his deer, submitted the animal to the Michigan Department of Natural Resources (MDNR) for examination. Tissues from the deer were subsequently sent to MDCH's Mycobacteriology laboratory. MDCH cultured and identified *M.bovis* from tissue specimens, leading to the first identified case of bovine TB in free ranging deer in the United States. Subsequently, deer were surveyed in the area where the animal was found in 1994, resulting in the establishment of a program to test and eradicate bovine TB from Michigan.

Since the 1970's, MDCH's Mycobacteriology laboratory has tested animal specimens, performing microbiological testing for Michigan State University's (MSU) Animal Health Diagnostic laboratory (AHDL), MDNR, MDA, USDA, the National Veterinary Service Laboratory (NVSL) and the Detroit Zoo. MDCH has tested animals including elephants, rhinoceroses, monkeys, cats, dogs, coyotes, opossums, raccoons, deer, elk, bear, fish, birds, shrews, voles, bobcats, red foxes, badgers, otters and cattle.

Since the fall of 1995, a statewide survey has been conducted by DNR and MSU scientists performing necropsy examinations of more than 88,000 animals looking for evidence of bovine TB. More than 2000 specimens from animals with suspicious lesions have been sent to MDCH for microscopic and culture examination. *M.bovis* has been cultured from more than 430 specimens, including deer, cattle, elk, coyotes, raccoons, black bear, bobcats, red fox, opossums and a cat. All but five of the infected animals were from twelve counties from Michigan's northern lower peninsula. Over 97 percent of the bovine TB infected deer have come from a five-county area including Alpena, Alcona, Montmorency, Oscoda and Presque Isle.

Since 1995, *M.bovis* has also been cultured from seven people residing in Michigan. All culture isolates recovered from these people were examined by restriction fragment length polymorphism (RFLP) at MDCH to determine their respective DNA fingerprints. Only one isolate has been shown to be the same strain as found in infected deer. The six other isolates were found to be unrelated to the deer strain. Epidemiological investigations have determined that each of these human cases were due to reactivation of past disease or travel to or from another state or country where *M.bovis* is commonly found.

In addition to routine testing services provided to Michigan's medical and human health agencies, MDCH will continue to provide laboratory testing and epidemiological investigation services, looking for new cases of bovine TB in humans and animals and assisting in its eradication. MDCH will also continue, in cooperation with other state and federal agencies, to determine whether the outbreak of bovine TB in Michigan's wild and domestic animal populations is responsible for the transmission of bovine TB to humans.

CDC Seeking National Antimicrobial Resistance Data

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Division of Infectious Diseases

The cumulative antimicrobial susceptibility summary (antibiogram) compiled from laboratory data is used not only by physicians to guide empiric therapy for local patients, but is also needed to detect trends or emerging new resistance on a nationwide basis. The importance of accurate susceptibility data extends far beyond the original patient. The CDC has placed top priority on development of a national antimicrobial resistance surveillance plan which involves clinical, reference, public health and veterinary laboratories. However, the CDC also acknowledges that the continual changes in susceptibility quality control procedures and breakpoints, the need for updates to quality assurance programs for susceptibility testing and the shortage of well-trained microbiologists can stretch already-thin laboratory resources.

To assist our Michigan colleagues in meeting this challenge, the Bureau of Laboratories was recently awarded funding by CDC for an innovative new project through the Epidemiology/Laboratory Capacity Building (ELC) Grants in 2001-2002. This funding provides for the position of a quality assurance microbiologist through the National Antimicrobial Resistance Project. This position will provide support to clinical microbiology laboratories in all aspects of their susceptibility testing: training, quality assurance, quality control, competency assessment, and the generation of reliable antibiogram data. MDCH plans to provide this support through training presentations, both on-site and web-based; antibiogram and procedure review services; and consultation with laboratories who desire help in preparation for accreditation inspections. In addition to working with laboratories, this position will collaborate with infection control practitioners in extended care facilities to monitor resistance.

As a start toward the eventual goal of nationwide tracking of antimicrobial resistance, you are asked to please forward a copy of the cumulative antibiogram data from your institution (year 2000 and/or 2001) to MDCH, 3350 N. Martin Luther King Jr. Blvd, P.O. Box 30035, Lansing, MI 48909 attention: Martha Boehme. The collected data will be stripped of identifying characteristics when it is presented as statewide statistics.
If you desire assistance in compiling antibiogram data, are interested in having a laboratory visit or have any other concerns regarding antimicrobial susceptibility testing, please contact Boehmem@michigan.gov or phone 517-335-9654.

MDCH Initiating Enterovirus Surveillance

Patty Clark, M.P.H.
Viral Serology/Viral Isolation Unit

The Michigan Department of Community Health is initiating an enterovirus surveillance program modeled after influenza surveillance. MDCH influenza surveillance relies upon preregistered sentinel physicians to submit viral specimens (at no charge) on suspect cases throughout the influenza season. These samples are assayed using a direct test, cultured, and typed with the results going back to the physician. This system enables us to keep abreast of the types of influenza circulating in the state. Seasonal influenza data is available to all on our Bureau of Laboratories (BOL) web site.

This year, MDCH is asking hospital laboratories, performing viral culture, to submit enterovirus isolates at a rate of one specimen per week. Only CSF or respiratory specimens are requested; no stool specimens, please. Hospital laboratories that do not have the ability to perform viral culture, are asked to submit CSF specimens on patients with suspect viral meningitis, again at the rate of one per week. The virology laboratory will type these isolates by the use of either direct fluorescent antibody utilizing monoclonal antibodies or molecular methods for types with no available monoclonal antibody. Results will be returned to the submitting agency. There will be no charge for this testing. A compilation of results will be available on the Bureau of Laboratories web page. The web page can be found by starting at www.michigan.gov/mdch. Enter “Lab Services” into the Search box and press GO. The BOL site should be the first or second on the generated list. Please bookmark the new site so you do not have to repeat the search process with each visit.

The goal of this enterovirus surveillance program is to track viruses circulating in the state with regard to location within the state, as well as population age and gender of patients. If you have questions about this surveillance program, please phone 517-335-8102, or e-mail ClarkP@michigan.gov.

FUN FUNGI.....Blastomycosis

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Mycobacteriology/Mycology Unit

Blastomycosis is a chronic granulomatous disease which develops a primary pulmonary infection, but can disseminate to other body sites. This primary infection in the lungs results from the inhalation of aerosolized *Blastomyces dermatitidis* conidia. Although blastomycosis infection initiates in the pulmonary cavity, infection is often asymptomatic. A secondary cutaneous infection, the most common form of extra-pulmonary disease, is manifested by skin lesions. Therefore, skin lesions are often the most frequently presented symptom of this disease. The disease's predilection for skin manifestations is commonly observed but not readily understood. The ecologic niche of *B. dermatitidis* is unknown but it is assumed to be a saprophyte in soil. Most cases of blastomycosis in North America occur in the region of the Mississippi River basin, including neighboring states: Arkansas, Kentucky, Louisiana, Missouri, North Carolina, and Tennessee. Blastomycosis also occurs in Ohio, Wisconsin and northern Michigan. Occupational exposure is most common among loggers, farmers and forestry workers.

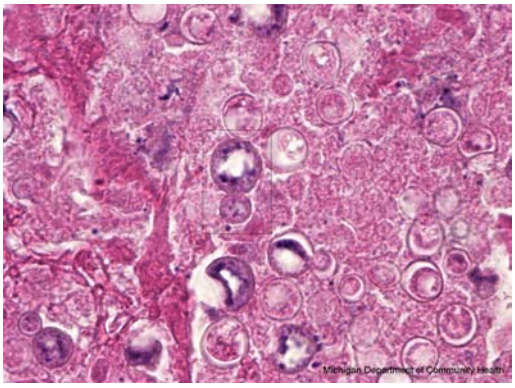
Blastomyces dermatitidis is a dimorphic fungus. It forms a yeast phase at 37EC and a mould phase at 25EC. At 25EC, growth is slow to moderately rapid and appears downy. The colony is white to beige on the surface with the reverse being cream to brownish in color. Microscopically, hyphae are hyaline and septate; the conidiophores are short and without branching. The conidia are hyaline, pyriform (pear shaped), unicellular and solitary. At 37EC, growth is slow to moderately rapid and the texture is creamy to granular. The color of the colony is white to beige. At 37EC, on enriched media, *B. dermatitidis* will convert to a yeast phase. Microscopically the yeast cells are large, have refractile walls and produce broad-based budding.

Case Study:

A 49 year old male was admitted to the hospital with multilobar pneumonia. He was treated at the hospital for several days with IV antibiotics. He was discharged with oral antibiotics after being afebrile for 48 hours. Eight days after he was released he was admitted through the emergency room of another hospital with increasing shortness of breath, fever up to 103EC, night sweats, shaking chills, a twenty pound weight gain and increased abdominal girth. The patient had a history of hypertension, smoking and diabetes mellitus. Upon admittance he was placed on IV antibiotics. The initial X-ray revealed a large pulmonary effusion with possible empyema. Despite extensive support, including IV antibiotics and intubation, the patient died six days after admittance to the hospital. On autopsy examination, disseminated disease was found. The infection initiated in the pulmonary cavity and disseminated to other body sites including the lymph nodes, spleen, kidneys, pancreas, liver, adrenals, thyroid and central nervous system. Microscopic exam of the various tissues revealed numerous foci of fungal organisms present with surrounding inflamation and necrosis. The organisms were large, variable in size and demonstrated a thick refractive cell wall. Many of the organisms demonstrated broad-based budding. The causative agent was determined to be *Blastomyces dermatitidis*.

Thank-you to Regional Medical Labs, Inc. for bringing this case to our attention.

***Blastomyces dermatitidis* in RMLL tissue**



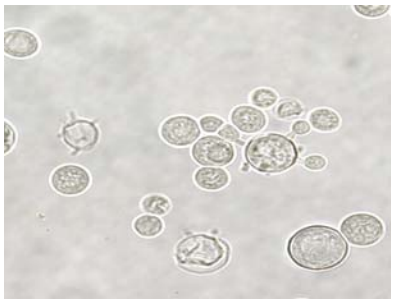
Last Issue's Picture Quiz Answer:

The photo was of the yeast phase of *Cokeromyces recurvatus*. *C. recurvatus* is a sporangiola- forming species of the family *Thamnidiaceae*, in the order of *Mucorales,* of the class *Zygomycetes*. It is typically a soil contaminant and rarely causes infection in humans. Rare cases of infection in pleural and peritoneal fluid, as well as occasional cystitis, have been reported. This isolate was received as a clinical specimen from peritoneal fluid. *C. recurvatus* is a dimorphic fungus. It forms a yeast phase when placed on cysteine agar at 37EC. Colonies appear gray, slightly wrinkled and pasty in texture. The yeast-like cells are large (up to 20Fm in diameter), spherical, with sparse but distinct budding.

Budding yeast cells can sometimes be mistaken for *Paracoccidioides brasiliensis*. The mould phase of *P.brasiliensis* and *C. recurvatus* are vastly different. At 25EC, isolates of *P. brasiliensis* are typically sterile. Some isolates produce solitary condidia and arthrocondia,

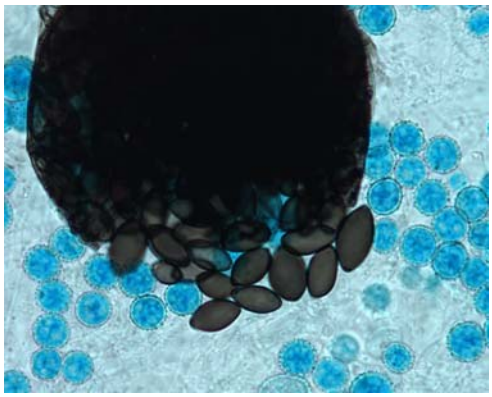
whereas *C. recurvatus* forms sporangiolas at 25EC. Macroscopically the colonies of *C. recurvatus* are tan, thin, and with continued incubation turn brown due to the production of zygospores. Microscopically the sporangiophores arise from vegetative hyphae without rhizoids and are mostly unbranched. Enlarged vesicles form at the apices of the sporangiophores which produce sporangiolar stalks (pedicels) which elongate rapidly and recurve back toward the vesicle. Sporangiola without apophysis, with columella, and with few sporangiospores form at end of the recurved sporangiolar stalks. Sexual zygospores will readily develop between opposing suspensory cells on the same hyphae. They are spherical, rough edged and dark brown in color.

Yeast phase at 37EC



Mould phase at 25EC

This issues picture quiz: What Mould is this?



New Rabies Antibody Report Format

Patty Clark, M.P.H.
Viral Serology/Viral Isolation Unit

Recent changes to the MDCH rabies antibody test format have resulted in changes in the reporting of rabies antibody test results. Procedural changes were initiated to follow the assay protocol used at the CDC rabies laboratory. In the past, rabies antibody results were reported in international units (IU) and titers. The report would not indicate when a booster dose of rabies vaccine was necessary. Instead, reports would give the antibody level with the statement "The World Health Organization recommends a minimum level of 0.5 IU." It was left to the submitter to interpret the results and decide if a booster dose of rabies vaccine was needed.

New reports will state "Rabies Antibody Present" or "Rabies Antibody Absent." When antibodies are not detected, this interpretation will appear on your report: "Interpretation of Results: No protective rabies antibodies detected. A booster dose of rabies vaccine is recommended if continued exposure to rabies virus exists." When an adequate amount of antibodies has been detected, the following interpretation will be included on reports: "Interpretation of Results: A sufficient level of protective rabies antibody detected. No booster dose of rabies vaccine is recommended at this time." When a low level of rabies antibody is detected and a booster dose of rabies vaccine is indicated, the following comment will appear on the new report form: "A low level of rabies antibody has been detected. Consider administering a booster dose of rabies vaccine to maintain a protective level of antibody." All reports will also specify the test method by including the following comment: "Testing performed by Rapid Fluorescent Focus Inhibition Test (RFFIT)."

Any questions regarding the results or interpretation of rabies antibody test results, please phone 517-335-8102 or e-mail ClarkP@michigan.gov.

Congenital Syphilis

William Crafts B.S., MT, (ASCP)
Bacterial and Parasitic Serology

A 31 year old female in her 38th week of gestation presented to the emergency room in labor. The mother had no prenatal care. Thirty minutes after her membranes ruptured the mother gave birth to a 6 pound baby boy. The amniotic fluid was visibly stained with meconium. Initial physical examination of the newborn revealed a male infant in respiratory distress with hepatosplenomegaly. The baby was started on ampicillin and cefotaxime after a CBC and a blood culture were obtained. Laboratory results reveal respiratory acidosis, hemolytic anemia and slight jaundice. The newborn was transfused with one unit of platelets and two units of packed cells.

The mother's serum, tested at MDCH, showed a reactive unheated serum reagin (USR) titer of 1:8 and a reactive *T. pallidum* particle microagglutination assay (TP-PA) specific for *T. pallidum* (Fujirebio Diagnostics Inc.). Despite the lack of visible genital lesions, rash or history of syphilis, the mother was diagnosed with early latent syphilis and the newborn was presumptively diagnosed with congenital syphilis.

The infant's serum was submitted to MDCH for syphilis testing. The USR titer was 1:128, the TP-PA was reactive, and the CSF-VDRL was nonreactive. The infant's serum was sent to CDC for IgM western blot testing (MarDx Diagnostics, Inc.) which detects neonatal immunoglobulin antibodies against specific *T. pallidum* antigens. Results revealed a prominent 47 kD and 15.5 kD band, a small 45 kD band, and no 17 kD band. This band pattern is considered positive for *T. pallidum* specific IgM antibody confirming the diagnosis of congenital syphilis.

The baby was treated with 200,000 units of penicillin G IV/Q12 while ampicillin and cefotaxime were discontinued. Radiographs of the long bones and a CT scan of the brain were unremarkable. Chest radiograph of the infant showed bilateral pulmonary infiltrate and a diffuse ground-glass appearance consistent with pneumonia alba. The baby required six days on oxygen and responded well to 14 days of antimicrobial therapy. Hepatosplenomegaly and pneumonia resolved and the baby was discharged to the care of his mother. The source and time of maternal infection remains unknown but believed to be at least 16 months prior to giving birth.

Inadequate or lack of prenatal care and maternal use of illicit drugs are major contributing factors in congenital syphilis. The newborn in this case presented with pneumonia, hepatosplenomegaly, anemia and slight jaundice; all signs of early congenital syphilis. A presumptive diagnosis was based on acute signs and symptoms along with reactive nontreponemal and treponemal test results. A positive *T. pallidum* IgM western blot result solidified the diagnosis.

In cases of congenital syphilis the outcome of pregnancy and severity of symptoms depend on the stage of maternal syphilis at the time of conception or the stage of gestation at the time of infection. If infection and conception occur simultaneously the baby frequently terminates in stillbirth, whereas if infection occurs later in pregnancy the baby may exhibit clinical manifestations ranging from stillbirth to an uninfected child.[1] Congenital syphilis remains a diagnostic challenge because pregnant women and infected infants are often asymptomatic. In one retrospective study, Reyes et al. reported that of 148 serologically positive mothers who delivered stillborn or infants with congenital syphilis only 4percent had a history of primary or secondary syphilis and 96 percent of those infected mothers were asymptomatic.[1]

Laboratory testing is critical in the diagnosis of congenital syphilis. An absolute diagnosis is confirmed by a positive darkfield examination of lesions, nasal drainage, umbilical cord, placenta or cord blood. A presumptive diagnosis is based on the presence of acute signs and symptoms along with reactive nontreponemal and treponemal test results. A four-fold difference in USR titer between the mother and baby, although often a good indication of congenital syphilis, does not always occur.

IgM specific *T. pallidum* antibodies, if present in infant serum, usually represent intrauterine response to infection. *T. pallidum* IgM specific antibodies can be detected by the FTA-ABS 19S IgM assay or the IgM western blot analysis available at CDC. False positive *T. pallidum* specific IgM assays, although rare, may be caused by severe fetal-maternal bleed or newborn production of IgM immunoglobulins to passively transferred IgG antibodies rather than in response to in utero infection.

The bacterial and parasitic unit at MDCH, in collaboration with the CDC, is currently involved in validation and verification studies on the MarDx IgM western blot assay with the goal of adding this assay to our test menu. Preliminary results indicate 100 percenet correlation with results performed at CDC.

The genome of *T. pallidum* has recently been sequenced refueling efforts by scientists to develop an effective vaccine to finally eliminate this organism. There remains a need for new epidemiological, immunological, clinical strategies, and immunization pursuits to fully eradicate *T. pallidum*.

[1] Reyes, M.P., Hunt, N., Ostrea, E.M., George, D., Maternal/Congenital syphilis in a large tertiary-care urban hospital. Clinical Infectious Diseases 1993;17:1041-6.

Special thanks to Brian Sheppard, MDCH, STD epidemiologist.

National Database for Surveillance of Methicillin Resistant *Staphylococcus aureus* Outbreaks

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MDCH Houghton Laboratory

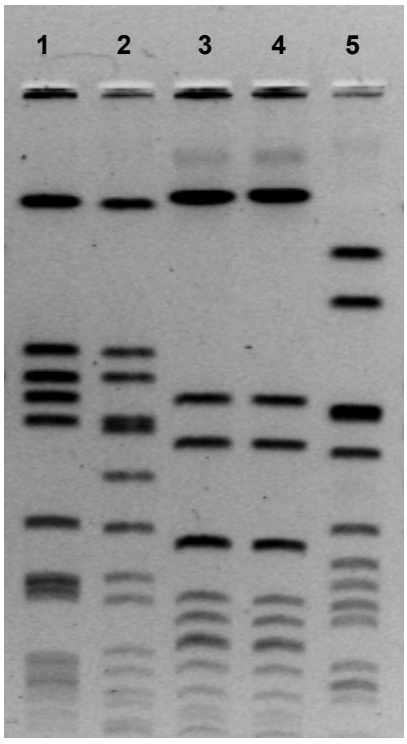
Methicillin resistant *Staphylococcus aureus* (MRSA) has been a growing public health concern since the early 1960's. MRSA organisms are no more virulent than susceptible *S. aureus*; however, because they are resistant to many antibiotics they may be more difficult to treat. MRSA is estimated to infect as many as 80,000 patients a year after they enter the hospital, accounting for 50 percent or more of nosocomial infections in some US hospitals.

In an effort to better understand and track MRSA outbreaks in the United States, the CDC is currently building a national database to correlate epidemiological information with genetic fingerprints of MRSA isolates. The MRSA database is modeled and built upon the existing infrastructure of a national network known as PulseNet. PulseNet is currently used for surveillance and cataloging the molecular subtypes of food-borne pathogens and forms a network that links all 50 state public health laboratories as well as some county, city and area laboratories with a national database maintained by the CDC.

Like the other databases that have been established within PulseNet, MRSA on PulseNet is expected to become a very powerful epidemiological tool for comparing the DNA fingerprints of MRSA isolates within an outbreak. MRSA on PulseNet may give insights into the temporal and geographical origins of outbreak strains; may provide correlations between genetic fingerprints and the susceptibility of specific demographic sub-populations; and may show relationships associated with increased virulence or pathogenicity. Information in the database may be used to increase our understanding of the basic biology of *Staphylococcus aureus*: helping to answer questions about mutation rates and how resistance genes move within a varied genetic population of *Staphylococcus* organisms.

There are many different methods for characterizing bacterial organisms. Traditionally bacteriophage typing has been used to characterize *Staphylococcus aureus* isolates. At a molecular level Pulse Field Gel Electrophoresis (PFGE) is currently one of the best methods for discriminating genetic differences and making correct associations between epidemiologically related organisms. Additionally PFGE is amenable to the high levels of standardization that are required to build a functional national database with data submitted from laboratories across the country. For these reasons PFGE was selected by PulseNet as the current “Gold Standard” for genotyping bacterial pathogens including MRSAs.

To genetically characterize an MRSA isolate by PFGE, bacterial DNA isolated from an overnight culture is processed with an enzyme called a restriction endonuclease that cuts the DNA into fragments at specific sequence locations. The resulting DNA fragments have varied lengths that are specific to each MRSA strain. These DNA fragments are next cast into an agarose gel and exposed to a pulsed electrical field. Because the DNA fragments are negatively charged, they will move through the agarose toward the positive electrode at a rate that is proportional to their size. At the end of the electrophoresis run the DNA fragments are distributed through the gel with the largest fragments near the top of the gel and the smallest near the bottom. An image of the gel is scanned into a computer and the banding patterns of the fragments are analyzed for similarities. A typical gel showing the DNA banding patterns of five *Staphylococcus aureus* isolates is shown below. The patterns in lanes 3 and 4 are identical and suggest that these isolates represent the same organism. The isolates represented in lanes 1, 2 and 5 show unique patterns indicating that these isolates are unrelated.



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(Continued from page 7)

The MRSA on PulseNet program was announced March 29, 2001. One year later twenty-two laboratories including MDCH have been certified or are in the process of certification to participate in the program. Although started a little over a year ago, the database is already showing some interesting correlations between the PFGE patterns of MRSA isolates and epidemiological data. The isolates are currently organized by computer analysis into nine groups or lineages, based upon similarities in their fingerprint patterns. Preliminary analysis with limited patient data, indicates that isolates from hospital acquired infections usually have PFGE patterns that are more closely related to each other than to MRSA isolates from community sources. These hospital acquired isolates are grouped by computer into a single lineage. Similarly, isolates from community acquired infections appear to be related and are grouped together in other lineages. One interesting lineage contains isolates form Native American populations and Australian Aboriginals.

Currently these correlations can only be made at a national level by scientists at the CDC. When MRSA on PulseNet is fully established and MDCH has full network access, the laboratory will be able to contribute MRSA patterns that are associated with Michigan outbreaks to the database and compare those PFGE patterns with patterns that are occurring nationally. Any correlations resulting from pattern matches in the national database may be used to provide a more complete epidemiological picture of MRSA isolates associated with Michigan outbreaks. Because the PFGE patterns of MRSA isolates are stored electronically, long-term surveillance can be provided between outbreaks, alerting infection control officers if specific genetic patterns are involved with recurring outbreaks at their healthcare facility. As a participant in the MRSA on PulseNet program, MDCH can offer the benefits of a powerful new tool for the epidemiological investigation of MRSA outbreaks.